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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 1341.1071 (JDH:MJH)

First Named Inventor or Application Identifier:

Yoshiko MIYAMOTO

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APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Assistant Commissioner for Patents**
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1. [X] Fee Transmittal Form
2. [X] Specification, Claims & Abstract ..... [Total Pages: 39]
3. [X] Drawing(s) *(35 USC 113)* .... [Total Sheets: 14]
4. [X] Oath or Declaration .... [Total Pages: 3]
   a. [X] Newly executed (original or copy)
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      Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
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   The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
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ACCOMPANYING APPLICATION PARTS

9. [X] Assignment Papers (cover sheet & document(s))
10. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [X] Power of Attorney
11. [ ] English Translation Document *(if applicable)*
12. [ ] Information Disclosure Statement (IDS)/PTO-1449[ ] Copies of IDS Citations
13. [ ] Preliminary Amendment
14. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. [X] Certified Copy of Priority Document(s) *(if foreign priority is claimed) Jp. App. 2000-077124, filed March 17, 2000*
16. [ ] Other:

17. If a CONTINUING APPLICATION, *check appropriate box and supply the requisite information:*

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18. CORRESPONDENCE ADDRESS

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NEW APPLICATION FEE TRANSMITTAL

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FEE CALCULATION (fees effective 10/01/00)

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	TOTAL CLAIMS	6 - 20 =	0	X $ 18 00 =	$
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Typed Name	Mark J. Henry	Reg. No.	36,162
Signature	Mark Henry	Date	November 14, 2000

OBJECT REFERENCE GENERATING DEVICE,
OBJECT REFERENCE GENERATING METHOD AND
COMPUTER READABLE RECORDING MEDIUM
FOR RECORDING AN OBJECT REFERENCE GENERATING PROGRAM

FIELD OF THE INVENTION

The present invention relates to an object reference generating device, for generating an object reference in CORBA (Common Object Request Broker Architecture), an object reference generating method, and a computer readable recording medium for recording an object reference generating program, and particularly, to an object reference generating program for providing a client with a naming service in CORBA that has a high degree of reliability regardless of the operating format or network format, an object reference generating method, and a computer readable recording medium for recording an object reference generating program.

BACKGROUND OF THE INVENTION

In recent years, the environment surrounding business information systems has greatly changed along with the rapid advances in internet technology as represented by the WWW (World Wide Web). In particular, recently, cooperation over a wide range exceeding that common hitherto has begun in the form of cooperation with business internal systems, group businesses and other businesses, and cooperation with general consumers aimed at improving customer service and improving the efficiency of business activity.

In a business information system supporting business activity, a rapid response to the aforementioned extreme changes in the business environment is desired. In this case, when adopting a technique for carrying out the complete reconstruction of a business information system, because of the barriers of development time and cost, it is difficult to respond quickly to extreme environmental changes. Therefore, in order to respond to extreme environmental changes, it is necessary to add items necessary to the new objectives as the occasion demands, while making effective use of existing assets. It is also necessary to select the optimum materials (vendor, hardware, software) at any particular time and for the existing system and the new system to have a common basis.

In order to obtain this common base, it is vital for the materials of the existing system and the materials of the new system to work in cooperation with each other without being conscious of any differences between them. Moreover, in the field of network computing, new technologies are being developed continuously and it is necessary that these new technologies can be dealt with flexibly. Because of this background, recently, attention has been focused on object-oriented technologies such as CORBA and the like which is a standard for distributed system architecture as a common basis for achieving cooperation between various computing environments.

CORBA is a standardized specification for connection between different varieties of equipment determined by a standardization OMG (Object Management Group), and regulates various types of API (Application Program Interface) for distributed application architecture and cooperation protocols between different varieties of equipment. Simply put, CORBA is a standard technology for providing a mechanism for a client to access an object (for example, an application program) in a server in a distributed system environment. In this case, the term object in CORBA means an entity identifiably encapsulated for providing either one or a plurality of services that can be requested by a client.

Fig. 12 is a block diagram showing a structural example 1 of a conventional object reference generating system that uses CORBA. In this diagram, business servers 10 and 20 are separately provided so as to distribute the load in response to accesses from a client 51 and a client 52 and provide the same service to the client 51 and the client 52. The business server 10 is connected to a network 30 and provides the object 11 (for example, an application program) to the clients 51 and 52. The TCT/IP (Transmission Control Protocol/Internet Protocol) IP address IP_1 is allocated to the business server

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A naming service section 12 provides a naming service in CORBA to the clients 51 and 52, and has the function of controlling the object 11 by name. By using this naming service, when the clients 51 and 52 access the object 11, the access is possible using the name and not the position of the object 11, therefore it is not necessary to be conscious of the physical position of the object 11.

Specifically, when access is made by the client 51 (or the client 52), the naming service 12 generates an object reference and returns this to the client 51 (or client 52) thus providing a naming service. This object reference is information for uniformly identifying objects by name and has the format F shown in Fig. 13.

As is shown in Fig. 13, the object reference is constructed from information consisting of "IOR (Interoperable Object Reference) header", "ID" (IDentification), "host name" (IP address), "PORT number", "object key", "tag component", and "other profile". IOR header is header information for the object reference. ID is an identifier for identifying the object reference.

Host name (IP address) is the name of the host having the object, specifically, the IP address of the server. PORT number is the port number for specifying an object within the server. Object key is information for uniformly specifying objects within a server. Returning to Fig. 12, the ORB (Object Request Broker: a mechanism for communicating between distributed objects) 13 is a software bus for acting as an intermediary between the business server 10 and the clients 51 and 52. The ORB 13 has an initial object reference that includes its own IP address and PORT number.

The business server 20 cooperates with the business server 10 to distribute the load and is connected to the network 30. The structure of the business server 20 is the same as that of the business server 10. Namely, each of the object 21, the naming service section 22, and the ORB 23 in the business server 20 is provided with the same functions as the object 11, the naming service section 12, and the ORB 13 in the business server 10. The IP address IP_2 is allocated to the business server 20.

The apportioning server 40 is designed to achieve a load distribution and is interposed between the network 30 and the network 50. The apportioning server 40 has a supervisory function of supervising the respective loads on the business server 10 and the business server 20, as well as an apportioning function of apportioning accesses from the client 51 (or the client 52) to the server with the lighter load out of the business server 10 and the business server 20. The IP address IP_3 is allocated to the apportioning server 40. The client 51 and the client 52 are connected to the network 50 and access the business server 10 or the business server 20 through the network 50, the apportioning server 40, and the network 30.

In the above structure, when there is an access request from the client 51, the access from the client 51 is apportioned by the apportioning server 40, for example, to the business server 10, which has a lighter load than the business server 20. As a result, the client 51 establishes a connection with the business server 10 after acquiring the ORB 13 object reference.

Next, the client 51 requests an object reference of the naming service section 12 from the naming service section 12. As a result, the naming service section 12 generates an object reference including at least the "host name" (IP address) = IP address IP_1 and the "PORT number" shown in Fig. 13, and notifies this to the client 51. The IP address in the object reference of the naming service section 12 is always IP address IP_1.

After receiving the object reference of the naming service section 12, the client 51 acquires the IP address IP_1 and the PORT number of the naming service section 12 and then establishes a connection with the naming service section 12. Next, the client 51 requests an object reference of the object 11 using this connection. When this object reference is received, the client 51 acquires the IP address IP_1 and the PORT number from the object reference and establishes a connection with the object reference 11. Thereafter, the client 51 receives distributions of the object 11 using this connection.

Fig. 14 is a block diagram showing a structural example 2 of a conventional object reference generating system that uses CORBA. This diagram shows an object reference generating system provided with: a single business server 60; a first group network 70 and a second group network 80 that are independent of each other; clients 71_1 to 71_n who are connected to the first group network 70 and form the first group; and clients 81_1 to 81_n who are connected to the second group network 80 and form the second group.

In this diagram, the business server 60 provides service to the clients 71_1 to 71_n and the clients 81_1 to 81_n and is connected to both the first group network 70 and the second group network 80. The IP address IP_4 and the IP address IP_5 are both allocated to the business server 60. The IP address IP_4 corresponds to the first group network 70 and the IP address IP_5 corresponds to the second group network 80.

The structure of the business server 60 is the same as that of the business server 10 (see Fig. 12). Namely, the object 61, the naming service section 62, and the ORB 63 of the business server 60 are provided with the same functions as the object 11, the naming service section 12, and the ORB 13 shown in Fig. 12.

In the above structure, a client 71_1 accesses the IP address IP_4 via the first group network 70. As a result, after acquiring the object reference of the ORB 63, the client 71_1 established a connection with the business server 60. Next, the client 71_1 requests an object reference of the naming service section 62 from the naming service section 62. As a result, the naming service section 62 generates an object reference including at least the "host name" (IP address) = IP address IP_4 and the PORT number shown in Fig. 13, and notifies this to the client 71_1. The IP address in the object reference of the naming service section 62 is IP address IP_4.

After receiving the object reference of the naming service section 62, the client 71_1 acquires the IP address IP_4 and the PORT number of the naming service section 62 and then establishes a connection with the naming service section 62. Next, the client 71_1 requests an object reference of the object 61 using this connection. When this object reference is received, the client 71_1 acquires the IP address IP_4 and the PORT number from the object reference and establishes a connection with the object reference 61. Thereafter, the client 71_1 receives distributions of the object 61 using this connection.

As described above, an example of load distribution was described in Fig. 12, however, in actual fact, in a conventional object reference generating system, the problem has existed that it has not been possible to distribute the load. Namely, in order to achieve load distribution, the client 51 needs to access the IP address IP_3 of the apportioning server 40.

However, because the IP address of the object reference generated in the naming service section 12 is IP address IP_1 and not IP address IP_3 for load distribution, the apportioning server 40 is not able to distribute the load. Accordingly, conventionally, the problems have existed that not only has it not been possible to increase reliability by load distribution, but also it has not been possible to provide a naming service in CORBA in a load distributed environment.

Moreover, in Fig. 14, an example was described in which there were provided a business server 60 having an IP address IP_4 and an IP address IP_5 and a first group network 70 and a second group network 80 which were both independent of each other. However, in actual fact, in a conventional object reference generating system, there are cases when the clients 71_1 to 71_n and the clients 81_1 to 81_n are not able to receive the services of the naming service.

Namely, when an access is made from any one of the clients 71_1 to 71_n, and when the IP address of the object reference generated in the naming service section 62 is IP address IP_4, the client is able to establish a connection with the object 61 through the first group network 70 and the IP address IP_4.

However, when an access is made from any one of the clients 71_1 to 71_n, and when the IP address of the object reference generated in the naming service section 62 is the other IP address IP_5, the problem arises that, because the first group network 70 does not correspond to the IP address IP_5, the client is not able to establish a connection with the object 61.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an object reference generating device capable of providing a naming service in CORBA to a client with a high degree of reliability regardless of the operating format or network format, as well as an object reference generating method, and a computer readable recording medium on which an object reference generating program is recorded.

In order to achieve the above objects, the present invention comprises a request receiving unit for receiving a request from a client connected via a network to acquire an object reference for receiving a distribution of a naming service in CORBA, and a generating unit for generating the object reference by dynamically setting address information contained in the object reference in accordance with connection information at the time of the request.

According to the present invention, address information is dynamically set and an object reference is generated in accordance with connection information at the time of a request from a client, therefore, in comparison with the address information being fixed once it has been set, as is the case conventionally, it is possible to provide a naming service in CORBA to a client with a high degree of reliability regardless of the operating format or network format.

Other objects and features of this invention will become understood from the following description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the structure of the first embodiment of the present invention.

Fig. 2 is a block diagram showing the structure of the business server 100 shown in Fig. 1.

Fig. 3 is a block diagram showing the structure of the business server 200 shown in Fig. 1.

Figs. 4A and 4B are flow chart describing the operation of the first embodiment.

Fig. 5 is a block diagram showing the structure of the second embodiment of the present invention.

Fig. 6 is a block diagram showing the structure of the business server 300 shown in Fig. 5.

Fig. 7 is a flow chart describing the operation of the second embodiment.

Fig. 8 is a block diagram showing the structure of the third embodiment of the present invention.

Fig. 9 is a block diagram showing the structure of the active business server 400 shown in Fig. 8.

Fig. 10 is a block diagram showing the structure of the standby business server 500 shown in Fig. 8.

Fig. 11 is a flow chart describing the operation of the third embodiment.

Fig. 12 is a block diagram showing a first structural example of a conventional object reference generating system.

Fig. 13 is a diagram showing a format F of an object reference.

Fig. 14 is a block diagram showing a second structural example of a conventional object reference generating system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The first to third embodiments of the object reference generating device, the object reference generating method, and the computer readable recording medium on which an object reference generating program is recorded, each according to the present invention, will now be described in detail with reference made to the drawings.

Fig. 1 is a block diagram showing the structure of the first embodiment of the present invention. In this diagram those portions corresponding to portions shown in Fig. 12 are given the same descriptive symbols and a description thereof is omitted. In Fig. 1, instead of the business server 10 and the business server 20 shown in Fig. 12, there are provided a business server 100 and a business server 200. The business server 100 and business server 200 are separately provided so as to distribute the load in response to accesses from a client 51 and a client 52 and provide the same service to the client 51 and the client 52.

The business server 100 is connected to a network 30 and provides the object 110 (for example, an application program) to the clients 51 and 52. The IP address IP_1 is allocated to the business server 100. A naming service section 120 provides a naming service to the clients 51 and 52 using an object reference, in the same way as the naming service 12 (see Fig. 12).

However, the object reference generating method of the naming service section 120 is different to the generating method of the naming service 12 as is described below. The ORB 130 is a software bus for acting as an intermediary between the business server 100 and the clients 51 and 52. The ORB 130 has an initial object reference that includes its own IP address and PORT number.

Fig. 2 is a block diagram showing the structure of the business server 100 shown in Fig. 1. In this diagram those portions corresponding to portions shown in Fig. 1 are given the same descriptive symbols. The ORB 130 shown in Fig. 2 is formed from a connection control section 131, an interface apportioning section 132, an ORB interface processing section

133, and a system structure information control section 134. The connection control section 131 controls the connections with the client 51 and the client 52.

The interface apportioning section 132 is provided with the function of apportioning the interface within the ORB 130. The ORB interface processing section 133 performs the interface processing between the interface apportioning section 132 and the naming service section 120, and between the system structure information control section 134 and the naming service section 120. In the naming service section 120, an object reference OR_1 having the format F shown in Fig. 13 is generated.

The system structure information control section 134 controls the system structure information J_1. This system structure information J_1 is information showing the structure of the object reference generating system (in this case, the load distribution structure) shown in Fig. 1. This system structure information J_1 is also information showing the corresponding relationship between the IP address for load distribution and the IP address subject to load distribution in the business server 100.

The IP address subject to load distribution is an IP address showing the subject of the load distribution, in other words, showing the destination of the load distribution, and, in this case, is the IP address IP_1 (see Fig. 1) allocated to the business server 100. The IP address for load distribution is an IP address for also applying a naming service to load distribution using the apportioning server 40, and, in this case, is the IP address IP_3 (see Fig. 1) allocated to the apportioning server 40. The structure information registering tool T registers the system structure information J_1 in the system structure information control section 134 by the operation of the system controller.

The business server 200 performs load distribution in cooperation with the business server 100 and is connected to the network 30. The structure of the business server 200 is the same as that of the business server 100. Namely, the object 210, the naming service section 220, and the ORB 230 in the business server 200 are respectively provided with the same functions as the object 110, the naming service section 120, and the ORB 130 in the business server 100. The IP address IP_2 is allocated to the business server 200.

Fig. 3 is a block diagram showing the structure of the business server shown 200 in Fig. 1. In this figure, the same descriptive symbols are given to those portions that correspond to portions in Fig. 1. The ORB 230 shown in Fig. 3 is formed from a connection control interface 231, an interface apportioning section 232, an ORB interface processing section 233, and a system structure information control section 234. The connection control section 231 controls connections with the client 51 and the client 52.

The interface apportioning section 232 has the function of apportioning the interface in the ORB 230. The ORB interface processing section 233 performs interface processing between the interface apportioning section 232 and the naming service section 220 and between the system structure information control section 234 and the naming service section 220. An object reference OR_2 having the format F shown in Fig. 13 is generated in the naming service section 220.

The system structure information control section 234 controls the system structure information J_2. This system structure information J_2 is information showing the structure of the object reference generating system (in this case, the load distributed structure) shown in Fig. 1. The system structure information J_2 also shows the corresponding relationship between the IP address for load distribution and the IP address subject to load distribution in the business server 200.

The IP address subject to the load distribution is an IP address showing the subject of the load distribution, in other words, showing the destination of the load distribution, and, in this case, is the IP address IP_2 (see Fig. 1) allocated to the business server 200. The IP address for load distribution is an IP address for applying a naming service to load distribution using the apportioning server 40, and, in this case, is the IP address IP_3 (see Fig. 1) allocated to the apportioning server 40. The structure information registering tool T registers the system structure information J_2 in the system structure information control section 234 by the operation of the system controller.

Next, the operation of the first embodiment will be described with reference made to the flow charts shown in Figs. 4A and 4B. When an object reference acquisition request for acquiring an object reference of the naming service is sent from the client 51 shown in Fig. 1, then, in step SB1 shown in Fig. 4B, the apportioning server 40 determines whether or not the arrival IP address is an apportioning IP address (in this case, the IP address IP_3). If, in this case, the arrival IP address is taken as the IP address IP_1, then the result of the determination is negative. In step SB4, the apportioning server 40 establishes a connection with the IP address IP_1 of the business server 100 and transmits the data from the client 51 to the relevant IP address IP_1.

As a result, a connection is established (SYN) between the connection control section 131 and the client 51 shown in Fig. 2. The fact that the arrival IP address = IP address IP_1 and that the arrival PORT = P_x is included in the connection information in this case. Next, the object reference acquisition request (REQUEST) from the client 51 and the connection information are transferred to the naming service section 120 via the interface apportioning section 132 and the ORB interface processing section 133.

As a result, in step SA1 shown in Fig. 4A, the naming service section 120 recognizes the IP address IP_1 (arrival IP address) of the connection information as the IP address and recognizes the arrival PORT = P_x of the connection information as the PORT number. In step SA2, the naming service section 120 refers to the system structure information J_1 and determines whether or not the recognized IP address (i.e. the IP address IP_1 in this case) is an IP address subject to load distribution. In this case, the result of the determination will be taken as affirmative.

In step SA3, the naming service section 120 refers to the system structure information J_1 and sets the IP address as an IP address for load distribution (in this case, the IP address IP_3). In step SA4, the naming service section 120 sets the host name of the object reference OR_1 (see Fig. 13) as the IP address for load distribution (in this case, the IP address IP_3). It then sets the PORT number of the object reference OR_1 as PORT and generates the object reference OR_1.

As a result, after the object reference OR_1 shown in Fig. 2 has been transferred as REPLY to the connection control section 131 via the ORB interface processing section 133 and the interface apportioning section 132, it is transferred as DATA to the client 51 via the network 30, the apportioning server

40, and the network 50 shown in Fig. 1.

Thereafter, based on the object reference OR_1 that includes at least the IP address IP_3, the client 51 sends an access request to the object 110 (or the object 210). Namely, if this access request is sent to the IP address IP_3, the apportioning server 40 distributes the load to that server out of the business server 100 and the business server 200 that has the lightest load. As a result, the client 51 is provided with the object 110 or the object 210 that was the destination of the load distribution.

If, however, the result of the determination in step SA2 shown in Fig. 4A is negative, then, in step SA4, the naming service section 120 sets the host name of the object reference OR_1 (see Fig. 13) as an IP address other than an IP address for load distribution. It also sets the PORT number of the object reference OR_1 as PORT and generates the object reference OR_1.

Moreover, When an object reference acquisition request for acquiring an object reference of the naming service is sent from the client 51 shown in Fig. 1, then, in step SB1 shown in Fig. 4 B, a determination is made as to whether or not the arrival IP address of the apportioning server 40 is an apportioning IP address (in this case, the IP address IP_3). If, in this case, the arrival IP address is taken as the IP address IP_2, then the result of the determination is negative. In step SB4, the apportioning server 40 establishes a connection with the IP address IP_2 of the business server 200 and transmits the data from the client 51 to the relevant IP address IP_2.

As a result, a connection is established (SYN) between the connection control section 231 and the client 51 shown in Fig. 3. The fact that the arrival IP address = IP address IP_2 and that the arrival PORT = P_x is included in the connection information in this case. Next, the object reference acquisition request (REQUEST) from the client 51 and the connection information are transferred to the naming service section 220 via the interface apportioning section 232 and the ORB interface processing section 233.

As a result, in step SA1 shown in Fig. 4 A, the naming service section 220 recognizes the IP address IP_2 (arrival IP address) of the connection information as the IP address and recognizes the arrival PORT = P_x of the connection information as the PORT number. In step SA2, the naming service section 220 refers to the system structure information J_2 and determines whether or not the recognized IP address (i.e. the IP address IP_2 in this case) is an IP address subject to load distribution. In this case, the result of the determination will be taken as affirmative.

In step SA3, the naming service section 220 refers to the system structure information J_2 and sets the IP address as an IP address for load distribution (in this case, the IP address IP_3). In step SA4, the naming service section 220 sets the host name of the object reference OR_2 (see Fig. 13) as the IP address for load distribution (in this case, the IP address IP_3). It then sets the PORT number of the object reference OR_2 as PORT and generates the object reference OR_2.

As a result, after the object reference OR_2 shown in Fig. 3 has been transferred as REPLY to the connection control section 231 via the ORB interface processing section 233 and the interface apportioning section 232, it is transferred as DATA to the client 51 via the network 30, the apportioning server 40, and the network 50 shown in Fig. 1.

Thereafter, based on the object reference OR_2 that includes at least the IP address IP_3, the client 51 sends an access request to the object 110 (or the object 210). Namely, if this access request is sent to the IP address IP_3, the apportioning server 40 distributes the load to that server out of the business server 100 and the business server 200 that has the lightest load. As a result, the client 51 is provided with the object 110 or the object 210 that was the destination of the load distribution.

As described above, according to the first embodiment, because the object reference OR_1 was generated by dynamically setting an IP address conforming to the load distribution system structure based on the system structure information J_1, it is possible to provide a naming service in CORBA with a high degree of reliability to a client even in a load distribution system.

Fig. 5 is a block diagram showing the structure of the second embodiment of the present invention. In this diagram, those portions that correspond to portions in Fig. 14 are given the same descriptive symbols and a description thereof is omitted. In this diagram, a business server 300 is provided instead of the business server 60 shown in Fig. 14.

Fig. 5 shows an object reference generating system provided with: a single business server 300; a first group network 70 and a second group network 80 that are independent of each other; clients 71_1 to 71_n who are connected to the first group network 70 and form a first group; and clients 81_1 to 81_n who are connected to the second group network 80 and form a second group.

In this diagram, the business server 300 provides service to the clients 71_1 to 71_n and the clients 81_1 to 81_n and is connected to both the first group network 70 and the second group network 80. The IP address IP_4 and the IP address IP_5 are both allocated to the business server 300. The IP address IP_4 corresponds to the first group network 70 and the IP address IP_5 corresponds to the second group network 80. The business server 300 is formed from an object 310, a naming service section 320, and an ORB 330.

Fig. 6 is a block diagram showing the structure of the business server 300 shown in Fig. 5. In this diagram, those portions that correspond to portions in Fig. 5 have been given the same descriptive symbols and a description thereof has been omitted. The ORB 330 shown in Fig. 6 is formed from a connection control section 331, an interface apportioning section 332, an ORB interface processing section 333, and a system structure information control section 334. The connection control section 331 controls the connections between the clients 71_1 to 71_n and the clients 81_1 to 81_n.

The interface apportioning section 332 is provided with the function of apportioning the interface within the ORB 330. The ORB interface processing section 333 performs the interface processing between the interface apportioning section 332 and the naming service section 320, and between the system structure information control section 334 and the naming service section 320. In the naming service section 320, an object reference OR_3 having the format F shown in Fig. 13 is generated.

The system structure information control section 334 controls system structure information J_3 the same as the system structure information J_1 and the like. However, in the second embodiment, the system structure information J_3 is not registered in the system structure information control section 334. This system structure information J_3 is registered when the business server 300 is functioning as a server for load distribution or as a server for hot standby (described below).

Next, the operation of the second embodiment will be described with reference made to the flow chart shown in Fig. 7. When an object reference acquisition request for acquiring an object reference of the naming service is sent from the client 71_1 shown in Fig. 5 to the IP address IP_4 shown in Fig. 5, a connection is established (SYN) between the connection control section 331 and the client 71_1 shown in Fig. 6. The fact that the arrival IP address = IP address IP_4 and that the arrival PORT = P_x is included in the connection information in this case. Next, the object reference acquisition request (REQUEST) from the client 71_1 and the connection information are transferred to the naming service section 320 via the interface apportioning section 332 and the ORB interface processing section 333.

As a result, in step SC1 shown in Fig. 7, the naming service section 320 recognizes the IP address IP_4 (arrival IP address) of the connection information as the IP address and recognizes the arrival PORT = P_x of the connection information as the PORT number. In step SC2, the naming service section 320 determines whether or not the recognized IP address (i.e. the IP address IP_4 in this case) is an IP address subject to load distribution. In this case, the result of the determination will be taken as negative.

In step SC4, the naming service section 320 sets the host name of the object reference OR_3 (see Fig. 13) as the IP address

IP_4 (the arrival IP address) of the connection information. It then sets the PORT number as connection information arrival PORT = P_x and generates the object reference OR_3.

After the object reference OR_3 has been transferred as REPLY to the connection control section 331 via the ORB interface processing section 333 and the interface apportioning section 332, it is transferred as DATA to the client 71_1 via the first group network 70 shown in Fig. 5. Thereafter, based on the object reference OR_3 that includes at least the IP address IP_4, the client 71_1 sends an access request to the object 310. Namely, if this access request is sent to the IP address IP_4, the client 71_1 is provided with the object 310.

If, however, the result of the determination in step SC2 shown in Fig. 7 is affirmative, then when the business server 300 is functioning as a server for load distribution, in step SC3, the naming service section 320 refers to the system structure information J_3 in the same way as in step SA3 (see Fig. 4A) and sets the IP address as an IP address for load distribution. In step SC4, the naming service section 320 sets the host name of the object reference OR_3 as an IP address for load distribution, sets the PORT number of the object reference OR_3 as PORT, and generates the object reference OR_3.

Note that, the naming service section 320 also generates an object reference OR_3 that includes the IP address IP_5 through the above described operation when an object reference acquisition request to the naming service is sent from the client 81_1 shown in Fig. 5. When this object reference OR_3 is transferred to the client 81_1, the client 81_1 sends an access request to the object 310 based on the object reference OR_3 that includes at least the IP address IP_5. Namely, if this access request is sent to the IP address IP_5, the client 81_1 is provided with the object 310.

As described above, according to the second embodiment, because the object reference OR_3 was generated by setting at least arrival IP address information contained in connection information as an IP address, it is possible to provide a naming service in CORBA with a high degree of reliability to a client even when the request destinations are a plurality of IP addresses corresponding to a plurality of first group networks 70 and second group networks 80 that are independent of each other.

Fig. 8 is a block diagram showing the structure of the third embodiment of the present invention. In this diagram, those portions that correspond to portions in Fig. 1 are given the same descriptive symbols and a description thereof is omitted. In Fig. 8, an active business server 400, a standby business server 500, and an observation server 600 are provided instead of the business server 100, the business server 200, and the apportioning server 40 shown in Fig. 1.

The active business server 400 and the standby business server 500 employ a hot standby structure. Namely, the active business server 400 normally provides service as an active system to the client 51 and the client 52, while the standby business server 500 provides service to the client 51 and 52 instead of the active business server 400 when an abnormality occurs in the active business server 400.

The observation server 600 observes the operational states of the active business server 400 and the standby business server 500 and has the function of apportioning accesses from the client 51 or the client 52 to the server currently being operated as active. The observation server 600 is given the IP address IP_8.

The active business server 400 is connected to the network 30 and supplies an object 110 (for example, an application program) to the clients 51 and 52. The IP address IP_6 is given to the active business server 400. In the same way as the naming service section 12 (see Fig. 1), the naming service section 410 provides a naming service to the clients 51 and 52 by object reference.

The object reference generating method of the naming service section 410 is different to the generation method of the naming service section 12, as is described later. The ORB 420 is a software bus for acting as an intermediary between the active business server 400 and the clients 51 and 52. The

ORB 420 has an initial object reference that includes its own IP address and PORT number.

Fig. 9 is a block diagram showing the structure of the business server 400 shown in Fig. 8. In this diagram those portions corresponding to portions shown in Fig. 8 are given the same descriptive symbols. The ORB 420 shown in Fig. 9 is formed from a connection control section 421, an interface apportioning section 422, an ORB interface processing section 423, and a system structure information control section 424. The connection control section 421 controls the connections with the client 51 and the client 52.

The interface apportioning section 422 is provided with the function of apportioning the interface within the ORB 420. The ORB interface processing section 423 performs the interface processing between the interface apportioning section 422 and the naming service section 410, and between the system structure information control section 424 and the naming service section 410. In the naming service section 410, an object reference OR_4 having the format F shown in Fig. 13 is generated.

The system structure information control section 424 controls the system structure information J_4. This system structure information J_4 is information showing the structure of the object reference generating system (in this case, the hot standby structure) shown in Fig. 8. This system structure information J_4 is also information showing the corresponding relationship between the IP address for hot standby and the IP address subject to hot standby in the business server 400.

The IP address subject to hot standby is an IP address specifying the subject of the hot standby, and, in this case, is the IP address IP_6 (see Fig. 8) allocated to the active business server 400. The IP address for hot standby is an IP address for applying a naming service to a hot standby structure using the observation server 600, and, in this case, is the IP address IP_8 (see Fig. 8) allocated to the observation server 600. The structure information registering tool T registers the system structure information J_4 in the system structure information control section 424 by the operation of the system controller.

The standby business server 500 shown in Fig. 8 completes the hot standby structure in cooperation with the active business server 400 and is connected to the network 30. The structure of the standby business server 500 is the same as that of the active business server 400. Namely, the object 210, the naming service section 510, and the ORB 520 in the standby business server 500 are respectively provided with the same functions as the object 110, the naming service section 410, and the ORB 420 in the active business server 400. The IP address IP_7 is allocated to the standby business server 500.

Fig. 10 is a block diagram showing the structure of the standby business server 500 shown in Fig. 8. In this figure, the same descriptive symbols are given to those portions that correspond to portions in Fig. 8. The ORB 520 shown in Fig. 10 is formed from a connection control interface 521, an interface apportioning section 522, an ORB interface processing section 523, and a system structure information control section 524. The connection control section 521 controls connections with the client 51 and the client 52.

The interface apportioning section 522 has the function of apportioning the interface in the ORB 520. The ORB interface processing section 523 performs interface processing between the interface apportioning section 522 and the naming service section 510 and between the system structure information control section 524 and the naming service section 510. An object reference OR_5 having the format F shown in Fig. 13 is generated in the naming service section 510.

The system structure information control section 524 controls the system structure information J_5. This system structure information J_5 is information showing the structure of the object reference generating system (in this case, the hot standby structure) shown in Fig. 8. The system structure information J_5 also shows the corresponding relationship between the IP address for hot standby and the IP address subject to hot standby in the standby business server 500.

The IP address subject to hot standby is an IP address showing the subject of the hot standby, and, in this case, is the IP address IP_7 (see Fig. 8) allocated to the standby business server 500. The IP address for hot standby is an IP address for applying a naming service to a hot standby structure using the observation server 600, and, in this case, is the IP address IP_8 (see Fig. 8) allocated to the observation server 600. The structure information registering tool T registers the system structure information J_5 in the system structure information control section 524 by the operation of the system controller.

Next, the operation of the third embodiment will be described with reference made to the flow charts shown in Figs. 11A and 11B. When an object reference acquisition request for acquiring an object reference of the naming service is sent from the client 51 shown in Fig. 8, then, in step SE1 shown in Fig. 11B, the observation server 600 determines whether or not the arrival IP address is an apportioning IP address (in this case, the IP address IP_8). If, in this case, the arrival IP address is taken as the IP address IP_6, then the observation server 600 takes the result of the determination in step SE1 as negative. In step SE4, the observation server 600 establishes a connection with the IP address IP_6 of the active business server 400 and transmits data from the client 51 to the relevant IP address IP_6.

As a result, a connection is established (SYN) between the connection control section 421 and the client 51 shown in

Fig. 9. The fact that the arrival IP address = IP address IP_6 and that the arrival PORT = P_x is included in the connection information in this case. Next, the object reference acquisition request (REQUEST) from the client 51 and the connection information are transferred to the naming service section 410 via the interface apportioning section 422 and the ORB interface processing section 423.

As a result, in step SD1 shown in Fig. 11A, the naming service section 410 recognizes the IP address IP_6 (arrival IP address) of the connection information as the IP address and recognizes the arrival PORT = P_x of the connection information as the PORT number. In step SD2, the naming service section 410 refers to the system structure information J_4 and determines whether or not the recognized IP address (i.e. the IP address IP_6 in this case) is an IP address subject to hot standby. In this case, the result of the determination will be taken as affirmative.

In step SD3, the naming service section 410 refers to the system structure information J_4 and sets the IP address as an IP address for hot standby (in this case, the IP address IP_8). In step SD4, the naming service section 410 sets the host name of the object reference OR_4 (see Fig. 13) as the IP address for hot standby (in this case, the IP address IP_8). It then sets the PORT number of the object reference OR_4 as PORT and generates the object reference OR_4.

As a result, after the object reference OR_4 shown in Fig. 9 has been transferred as REPLY to the connection control section 421 via the ORB interface processing section 423 and the interface apportioning section 422, it is transferred as DATA to the client 51 via the network 30, the observation server 600, and the network 50 shown in Fig. 8.

Thereafter, based on the object reference OR_4 that includes at least the IP address IP_8, the client 51 sends an access request to the object 110 (or the object 210). Namely, if this access request is sent to the IP address IP_8, then, in step SE1 shown in Fig. 11B, the observation server 600 takes the result of the determination as affirmative. In step SE2, the observation server 600 apportions the access request to the active business server 400 out of the active business server 400 and the standby business server 500 that are in operation. In step SE3, the observation server 600 establishes a connection between the client 51 and the active business server 400.

As a result, the client 51 is provided with the object 110 in the active business server 400. Note that, when the operation of the active business server 400 is halted, the observation server 600 apportions the access request to the standby business server 500. In this case, the client 51 is provided with the object 210 in the standby business server 500.

As described above, according to the third embodiment, because the object reference OR_4 was generated by dynamically setting an IP address conforming to the hot standby structure based on the system structure information J_4, it is possible to provide a naming service in CORBA with a high degree of reliability to a client even in a hot standby system.

In this way, according to the first to third embodiments, because, for example, an IP address is dynamically set and an object reference generated in accordance with connection information at the time a request is made by a client, in comparison with the IP address being fixed once it has been set, as is the case conventionally, it is possible to provide a naming service in CORBA to a client with a high degree of reliability regardless of the operating format or network format.

The first to third embodiments of the present invention have been described above in detail with reference made to the drawings, however, specific structural examples are not limited to these first to third embodiments. Namely, any alterations in design that do not deviate from the substance of the present invention are included in the present invention. For example, in the aforementioned first to third embodiments, it is also possible to record an object reference generating program for fulfilling the function of generating an object reference on a computer readable recording medium; reading on a computer (omitted from the drawings) the object reference generating program recorded on the recording medium; and generating the object reference by running this program.

This computer is formed from a CPU for running the object reference generating program, an input device such as a keyboard and a mouse, ROM (Read Only Memory) for storing various types of data, RAM (Random Access Memory) for storing calculation parameters and the like, a reading device for reading the object reference generating program from the recording medium, output devices such as a display, printer, or the like, and a bus for connecting the various devices.

After the CPU has read via the reading device the object reference generating program recorded on the recording medium, the CPU generates an object reference by running the object reference generating program. Note that, portable recording media such as optical disks, floppy disks, and hard disks may naturally be used as the recording medium, while transmission media that temporarily record and hold data, such as a network, may also be used as the recording medium.

As has been described above, according to the present invention, the effect is obtained that, because address information is dynamically set and an object reference generated in accordance with connection information at the time a request is made by a client, in comparison with the IP address being fixed once it has been set, as is the case conventionally, it is possible to provide a naming service in CORBA to a client with a high degree of reliability regardless of the operating format or network format.

Moreover, according to the present invention, the effect is obtained that, because an object reference is generated by setting at least arrival address information contained in connection information as address information, it is possible to provide a naming service in CORBA with a high degree of reliability to a client even when the request destinations are a plurality of groups of address information corresponding to a plurality of networks that are independent of each other.

Moreover, according to the present invention, the effect is obtained that, because an object reference is generated by dynamically setting address information conforming to the system structure based on system structure information, it is possible to provide a naming service in CORBA with a high degree of reliability to a client even in a load distribution system, hot standby system, and the like.

Although the invention has been described with respect to a specific embodiment for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art which fairly fall within the basic teaching herein set forth.

WHAT IS CLAIMED IS:

1. An object reference generating device comprising:

a request receiving unit which receives a request from a client connected via a network to acquire an object reference for receiving a distribution of a naming service in CORBA; and

a generating unit which generates the object reference by dynamically setting address information contained in the object reference in accordance with connection information at the time of the request.

2. The object reference generating device according to claim 1, wherein said generating unit generates the object reference by setting at least the arrival address information contained in the connection information as the address information.

3. The object reference generating device according to claim 1, said object reference generating device comprising a system structure information control unit which controls system structure information showing a structure of a system in which an object reference is applied, wherein said generating unit generates the object reference by dynamically setting address information conforming to the structure of the system based on the system structure information.

4. The object reference generating device according to claim 3, wherein said system structure information shows at least a structure of a load distribution system and a hot standby system.

5. An object reference generating method comprising:

a request receiving step in which a request from a client connected via a network to acquire an object reference for receiving a distribution of a naming service in CORBA is received ; and

a generating step in which the object reference is generated by dynamically setting address information contained in the object reference in accordance with connection information at the time of the request.

6. A computer readable recording medium on which is recorded an object reference generating program for performing on a computer:

a request receiving step for receiving a request from a client connected via a network to acquire an object reference for receiving a distribution of a naming service in CORBA; and

a generating step for generating the object reference by dynamically setting address information contained in the object reference in accordance with connection information at the time of the request.

ABSTRACT OF THE DISCLOSURE

A naming service in CORBA is provided to a client with a high degree of reliability regardless of the operating format or network format. There are provided, an ORB for receiving a request from a client connected via a network, an apportioning server, and a network to acquire an object reference in order to be provided with an object, and a naming service section for generating an object reference by dynamically setting address information included in the object reference, in accordance with connection information at the time of the request.

FIG.1

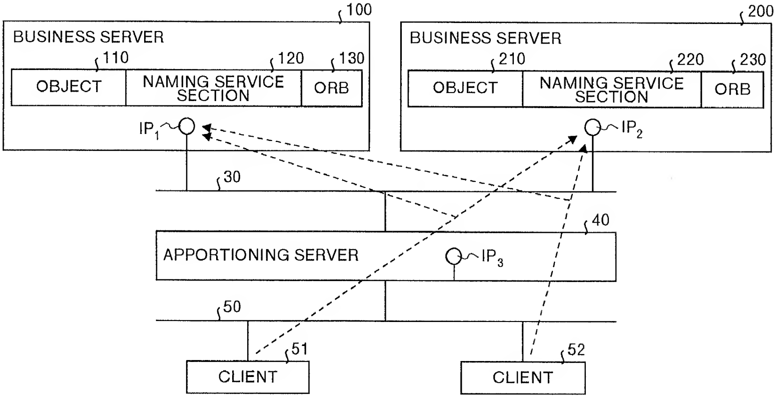
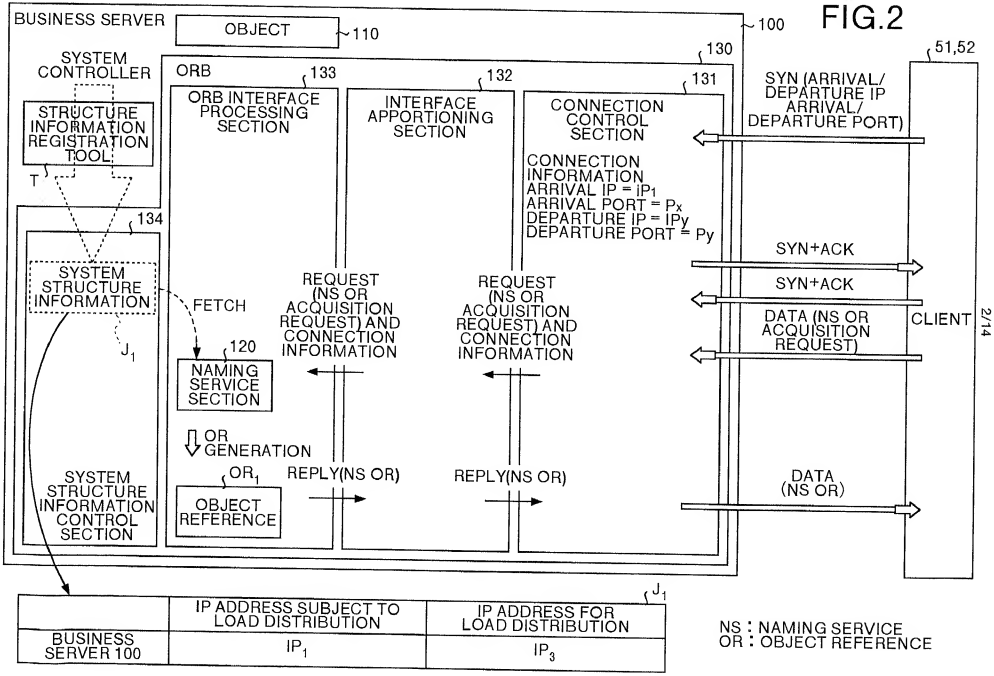

100
BUSINESS SERVER
110
OBJECT
120
NAMING SERVICE SECTION
130
ORB
IP$_1$
200
BUSINESS SERVER
210
OBJECT
220
NAMING SERVICE SECTION
230
ORB
IP$_2$
30
40
APPORTIONING SERVER
IP$_3$
50
51
CLIENT
52
CLIENT

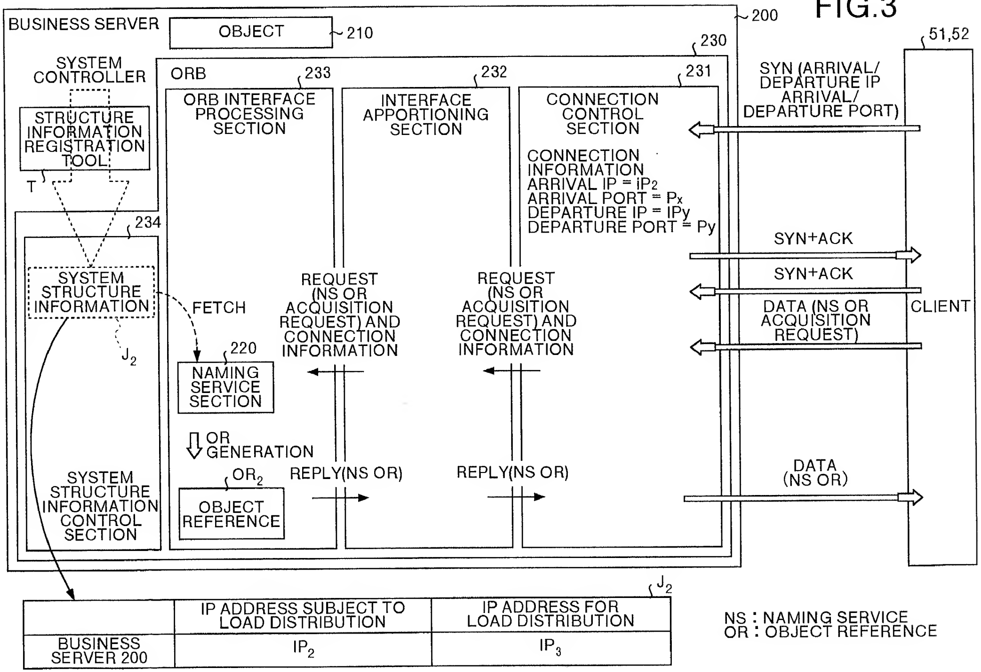
FIG.2


BUSINESS SERVER
OBJECT
110
100
130
51,52
SYSTEM CONTROLLER
ORB
133
132
131
STRUCTURE INFORMATION REGISTRATION TOOL
T
ORB INTERFACE PROCESSING SECTION
INTERFACE APPORTIONING SECTION
CONNECTION CONTROL SECTION
SYN (ARRIVAL/ DEPARTURE IP ARRIVAL/ DEPARTURE PORT)
CONNECTION INFORMATION
ARRIVAL IP = iP1
ARRIVAL PORT = Px
DEPARTURE IP = IPy
DEPARTURE PORT = Py
134
SYN+ACK
SYN+ACK
SYSTEM STRUCTURE INFORMATION
FETCH
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
DATA (NS OR ACQUISITION REQUEST)
CLIENT
J_1
120
NAMING SERVICE SECTION
OR GENERATION
OR_1
REPLY(NS OR)
REPLY(NS OR)
DATA (NS OR)
OBJECT REFERENCE
SYSTEM STRUCTURE INFORMATION CONTROL SECTION
J_1

	IP ADDRESS SUBJECT TO LOAD DISTRIBUTION	IP ADDRESS FOR LOAD DISTRIBUTION
BUSINESS SERVER 100	IP_1	IP_3

NS : NAMING SERVICE
OR : OBJECT REFERENCE

FIG.3


BUSINESS SERVER
OBJECT
210
200
230
51,52
SYSTEM CONTROLLER
STRUCTURE INFORMATION REGISTRATION TOOL
T
ORB
233
ORB INTERFACE PROCESSING SECTION
232
INTERFACE APPORTIONING SECTION
231
CONNECTION CONTROL SECTION
CONNECTION INFORMATION
ARRIVAL IP = iP2
ARRIVAL PORT = Px
DEPARTURE IP = IPy
DEPARTURE PORT = Py
SYN (ARRIVAL/ DEPARTURE IP ARRIVAL/ DEPARTURE PORT)
SYN+ACK
SYN+ACK
DATA (NS OR ACQUISITION REQUEST)
CLIENT
DATA (NS OR)
234
SYSTEM STRUCTURE INFORMATION
J2
FETCH
220
NAMING SERVICE SECTION
OR GENERATION
OR2
OBJECT REFERENCE
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
REPLY(NS OR)
REPLY(NS OR)
SYSTEM STRUCTURE INFORMATION CONTROL SECTION
J2

	IP ADDRESS SUBJECT TO LOAD DISTRIBUTION	IP ADDRESS FOR LOAD DISTRIBUTION
BUSINESS SERVER 200	IP_2	IP_3

NS : NAMING SERVICE
OR : OBJECT REFERENCE

FIG.4A

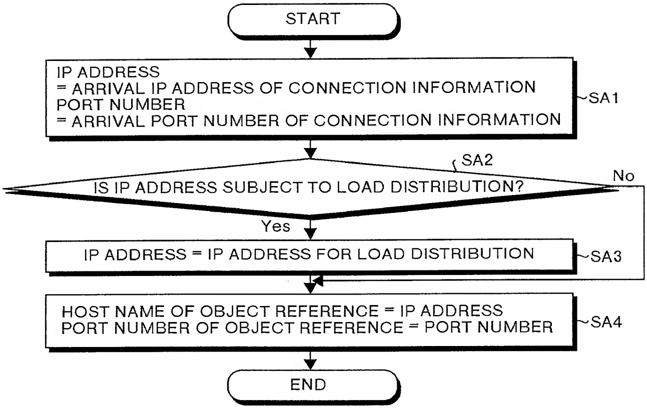

START
IP ADDRESS
= ARRIVAL IP ADDRESS OF CONNECTION INFORMATION
PORT NUMBER
= ARRIVAL PORT NUMBER OF CONNECTION INFORMATION
SA1
SA2
IS IP ADDRESS SUBJECT TO LOAD DISTRIBUTION?
No
Yes
IP ADDRESS = IP ADDRESS FOR LOAD DISTRIBUTION
SA3
HOST NAME OF OBJECT REFERENCE = IP ADDRESS
PORT NUMBER OF OBJECT REFERENCE = PORT NUMBER
SA4
END

FIG.4B

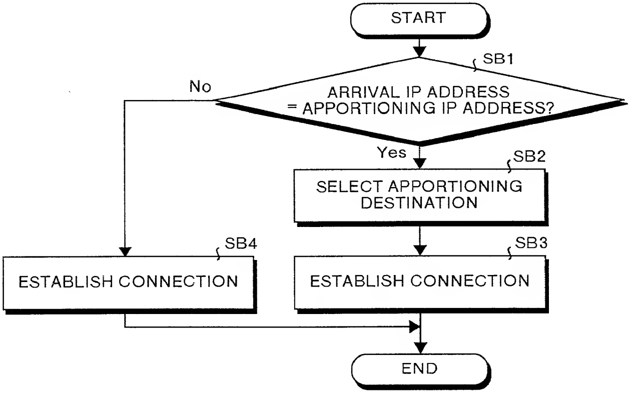

START
SB1
No
ARRIVAL IP ADDRESS
= APPORTIONING IP ADDRESS?
Yes
SB2
SELECT APPORTIONING DESTINATION
SB4
ESTABLISH CONNECTION
SB3
ESTABLISH CONNECTION
END

FIG.5

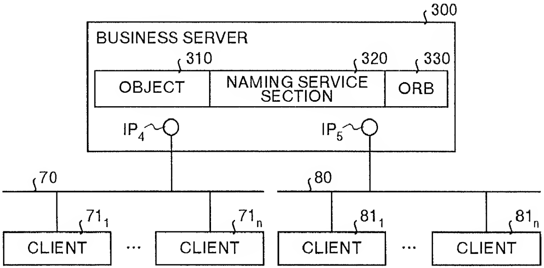
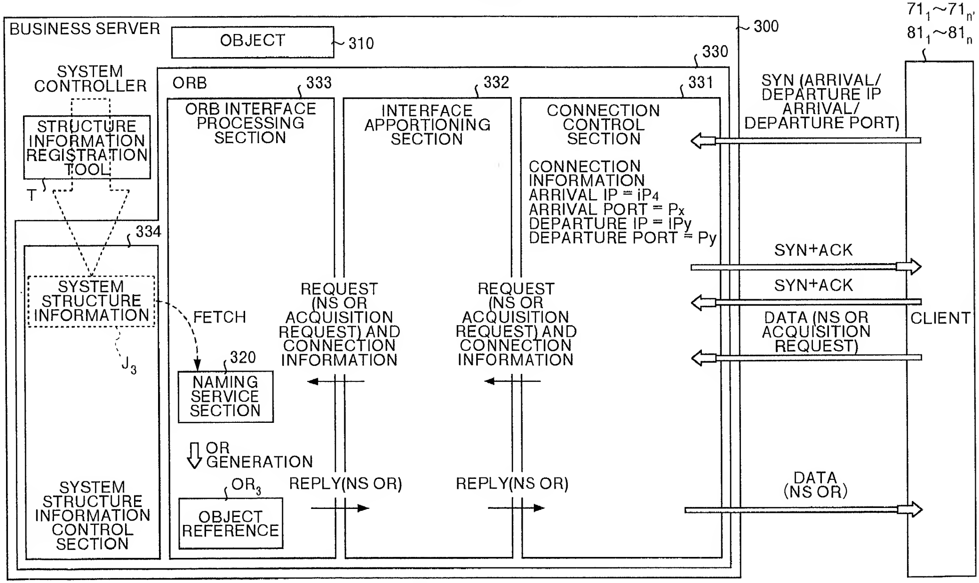

300
BUSINESS SERVER
310
320
330
OBJECT
NAMING SERVICE SECTION
ORB
IP4
IP5
70
80
71 1
71 n
81 1
81 n
CLIENT
CLIENT
CLIENT
CLIENT

FIG.6


BUSINESS SERVER
OBJECT
310
300
71$_1$~71$_{n'}$
81$_1$~81$_n$
330
ORB
333
332
331
SYSTEM CONTROLLER
STRUCTURE INFORMATION REGISTRATION TOOL
T
334
ORB INTERFACE PROCESSING SECTION
INTERFACE APPORTIONING SECTION
CONNECTION CONTROL SECTION
CONNECTION INFORMATION
ARRIVAL IP = iP4
ARRIVAL PORT = Px
DEPARTURE IP = IPy
DEPARTURE PORT = Py
SYN (ARRIVAL/ DEPARTURE IP ARRIVAL/ DEPARTURE PORT)
SYN+ACK
SYN+ACK
DATA (NS OR ACQUISITION REQUEST)
CLIENT
SYSTEM STRUCTURE INFORMATION
FETCH
J$_3$
320
NAMING SERVICE SECTION
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
OR GENERATION
OR$_3$
OBJECT REFERENCE
REPLY(NS OR)
REPLY(NS OR)
DATA (NS OR)
SYSTEM STRUCTURE INFORMATION CONTROL SECTION

NS : NAMING SERVICE
OR : OBJECT REFERENCE

FIG.7

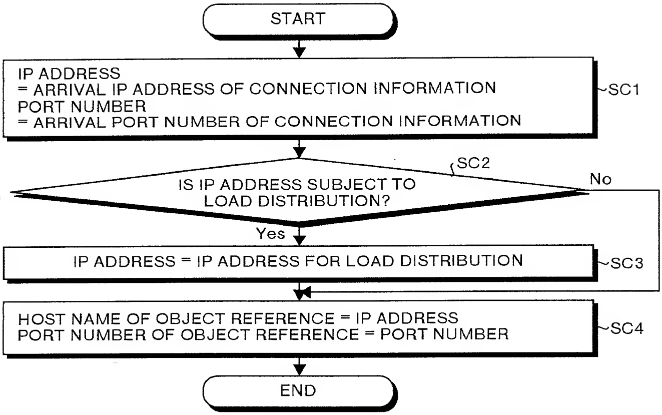

START
IP ADDRESS
= ARRIVAL IP ADDRESS OF CONNECTION INFORMATION
PORT NUMBER
= ARRIVAL PORT NUMBER OF CONNECTION INFORMATION
SC1
IS IP ADDRESS SUBJECT TO LOAD DISTRIBUTION?
SC2
No
Yes
IP ADDRESS = IP ADDRESS FOR LOAD DISTRIBUTION
SC3
HOST NAME OF OBJECT REFERENCE = IP ADDRESS
PORT NUMBER OF OBJECT REFERENCE = PORT NUMBER
SC4
END

FIG.8

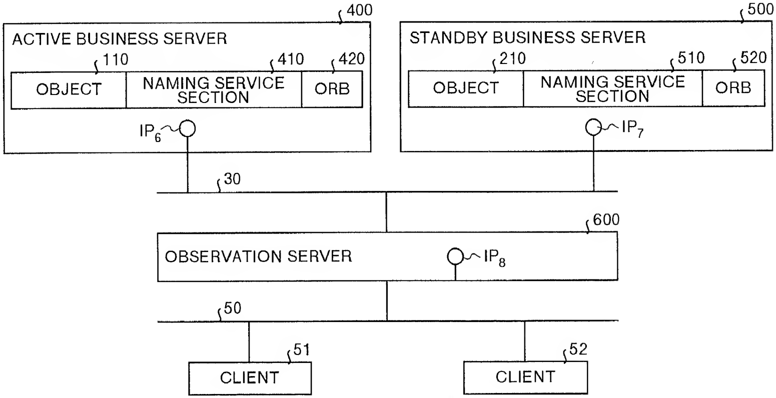
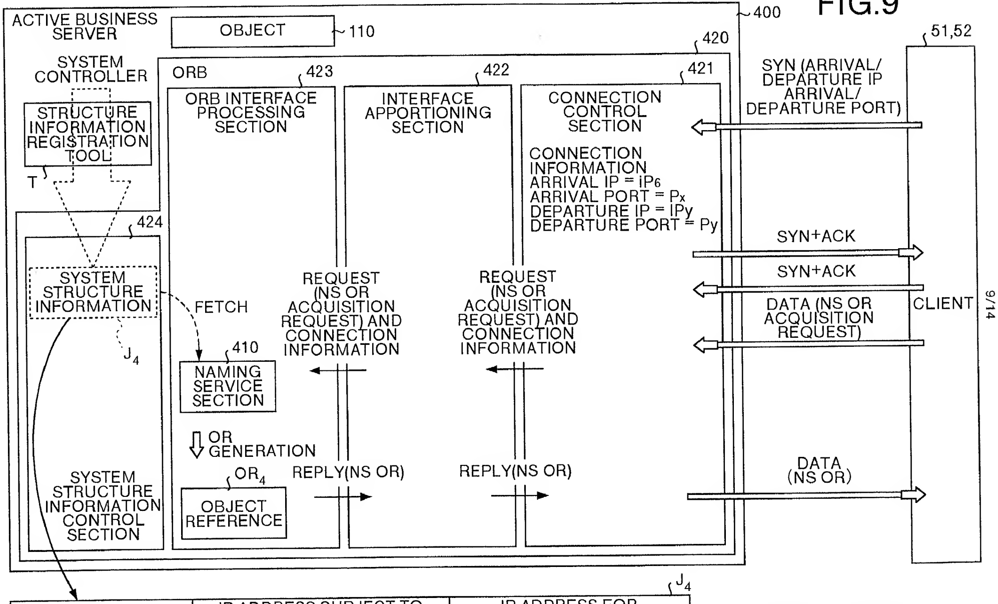

400
ACTIVE BUSINESS SERVER
110
410
420
OBJECT
NAMING SERVICE SECTION
ORB
IP_6
500
STANDBY BUSINESS SERVER
210
510
520
OBJECT
NAMING SERVICE SECTION
ORB
IP_7
30
600
OBSERVATION SERVER
IP_8
50
51
CLIENT
52
CLIENT

FIG.9

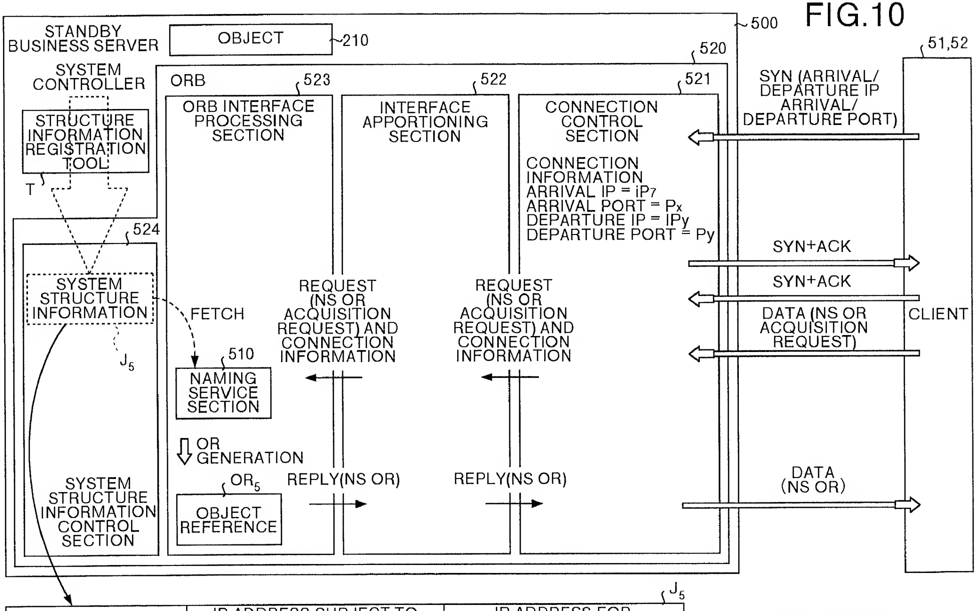


ACTIVE BUSINESS SERVER
400
OBJECT
110
SYSTEM CONTROLLER
STRUCTURE INFORMATION REGISTRATION TOOL
T
424
SYSTEM STRUCTURE INFORMATION
J4
SYSTEM STRUCTURE INFORMATION CONTROL SECTION
420
ORB
423
ORB INTERFACE PROCESSING SECTION
FETCH
410
NAMING SERVICE SECTION
OR GENERATION
OR4
OBJECT REFERENCE
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
REPLY(NS OR)
422
INTERFACE APPORTIONING SECTION
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
REPLY(NS OR)
421
CONNECTION CONTROL SECTION
CONNECTION INFORMATION
ARRIVAL IP = iP6
ARRIVAL PORT = Px
DEPARTURE IP = IPy
DEPARTURE PORT = Py
51,52
CLIENT
SYN (ARRIVAL/ DEPARTURE IP ARRIVAL/ DEPARTURE PORT)
SYN+ACK
SYN+ACK
DATA (NS OR ACQUISITION REQUEST)
DATA (NS OR)
J4

	IP ADDRESS SUBJECT TO HOT STANDBY	IP ADDRESS FOR HOT STANDBY
ACTIVE BUSINESS SERVER 400	IP_6	IP_8

NS : NAMING SERVICE
OR : OBJECT REFERENCE

FIG.10



STANDBY BUSINESS SERVER
~500
OBJECT
~210
SYSTEM CONTROLLER
STRUCTURE INFORMATION REGISTRATION TOOL
T
524
SYSTEM STRUCTURE INFORMATION
J5
SYSTEM STRUCTURE INFORMATION CONTROL SECTION
520
ORB
523
ORB INTERFACE PROCESSING SECTION
FETCH
510
NAMING SERVICE SECTION
OR GENERATION
OR5
OBJECT REFERENCE
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
REPLY(NS OR)
522
INTERFACE APPORTIONING SECTION
REQUEST (NS OR ACQUISITION REQUEST) AND CONNECTION INFORMATION
REPLY(NS OR)
521
CONNECTION CONTROL SECTION
CONNECTION INFORMATION
ARRIVAL IP = iP7
ARRIVAL PORT = Px
DEPARTURE IP = IPy
DEPARTURE PORT = Py
SYN (ARRIVAL/ DEPARTURE IP ARRIVAL/ DEPARTURE PORT)
SYN+ACK
SYN+ACK
DATA (NS OR ACQUISITION REQUEST)
DATA (NS OR)
51,52
CLIENT
J5

	IP ADDRESS SUBJECT TO HOT STANDBY	IP ADDRESS FOR HOT STANDBY
STANDBY BUSINESS SERVER 500	IP_7	IP_8

NS : NAMING SERVICE
OR : OBJECT REFERENCE

FIG.11A

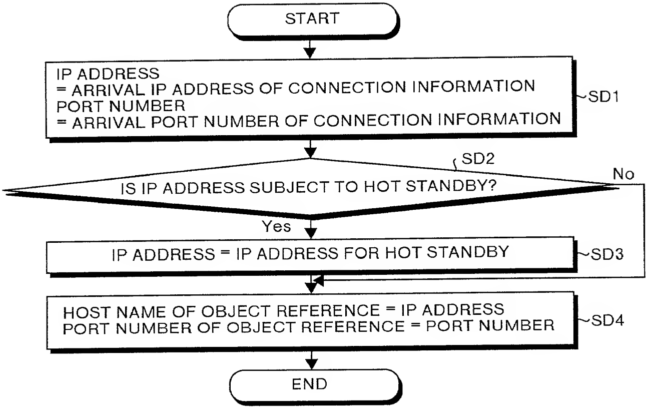

START
IP ADDRESS
= ARRIVAL IP ADDRESS OF CONNECTION INFORMATION
PORT NUMBER
= ARRIVAL PORT NUMBER OF CONNECTION INFORMATION
SD1
SD2
IS IP ADDRESS SUBJECT TO HOT STANDBY?
No
Yes
IP ADDRESS = IP ADDRESS FOR HOT STANDBY
SD3
HOST NAME OF OBJECT REFERENCE = IP ADDRESS
PORT NUMBER OF OBJECT REFERENCE = PORT NUMBER
SD4
END

FIG.11B

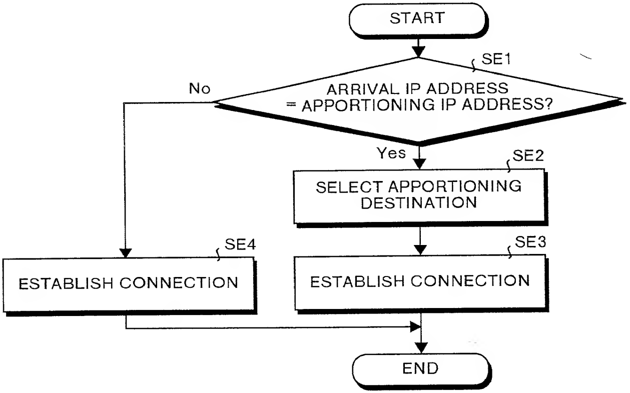


FIG.12

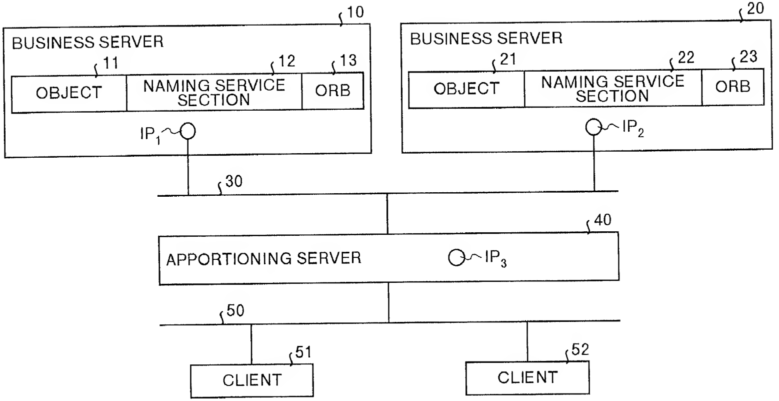

10
BUSINESS SERVER
11
OBJECT
12
NAMING SERVICE SECTION
13
ORB
IP$_1$
20
BUSINESS SERVER
21
OBJECT
22
NAMING SERVICE SECTION
23
ORB
IP$_2$
30
40
APPORTIONING SERVER
IP$_3$
50
51
CLIENT
52
CLIENT

FIG.13

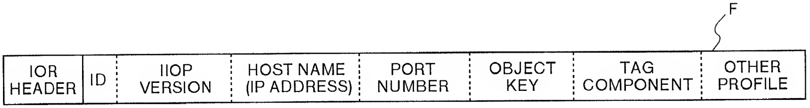
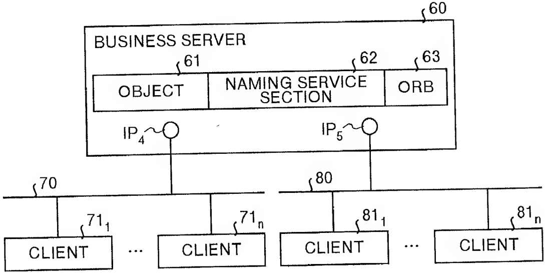

F
IOR HEADER
ID
IIOP VERSION
HOST NAME (IP ADDRESS)
PORT NUMBER
OBJECT KEY
TAG COMPONENT
OTHER PROFILE

FIG.14


60
BUSINESS SERVER
61
OBJECT
62
NAMING SERVICE SECTION
63
ORB
IP$_4$
IP$_5$
70
80
71_1
CLIENT
...
71_n
CLIENT
81_1
CLIENT
...
81_n
CLIENT

PTO/SB/106 (8-96)
Approved for use through 9/30/98. OMB 0651-0032
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Declaration and Power of Attorney For Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

OBJECT REFERENCE GENERATING DEVICE, OBJECT REFERENCE GENERATING METHOD AND COMPUTER READABLE RECORDING MEDIUM FOR RECORDING AN OBJECT REFERENCE GENERATING PROGRAM

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

□ ＿月＿日に提出され、米国出願番号または特許協定条約国際出願番号を＿＿＿＿＿＿とし、
（該当する場合）＿＿＿＿＿＿ に訂正されました。

□ was filed on ＿＿＿＿＿＿＿＿
as United States Application Number or
PCT International Application Number
＿＿＿＿＿＿ and was amended on
＿＿＿＿＿＿ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第３７編第１条５６項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Burden Hour Statement: This form is estimated to take 0.4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO Commissioner of Patents and Trademarks, Washington, DC 20231.

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Japanese Language Declaration
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私は、米国法典第３５編１１９条(a)-(d)項又は３６５条(b)項に基き下記の、米国以外の国の少なくとも一ヵ国を指定している特許協力条約３６５(a)項に基ずく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)
外国での先行出願

			Priority Not Claimed 優先権主張なし
2000-077124	Japan	17/March/2000	
(Number) （番号）	(Country) （国名）	(Day/Month/Year Filed) （出願年月日）	□
(Number) （番号）	(Country) （国名）	(Day/Month/Year Filed) （出願年月日）	□

私は、第３５編米国法典１１９条(e)項に基いて下記の米国特許出願規定に記載された権利をここに主張いたします。

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.) （出願番号）	(Filing Date) （出願日）	(Application No.) （出願番号）	(Filing Date) （出願日）

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I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

(Application No.) （出願番号）	(Filing Date) （出願日）	(Status: Patented, Pending, Abandoned) （現況：特許許可済、係属中、放棄済）
(Application No) （出願番号）	(Filing Date) （出願日）	(Status: Patented, Pending, Abandoned) （現況：特許許可済、係属中、放棄済）

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Japanese Language Declaration
（日本語宣言書）

委任状：　私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。（弁護士、または代理人の氏名及び登録番号を明記のこと）

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith *(list name and registration number)*

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第二共同発明者	Full name of second joint inventor, if any
第二共同発明者　日付	Second inventor's signature　Date
住所	Residence
国籍	Citizenship
私書箱	Post Office Address

（第三以降の共同発明者についても同様に記載し、署名をすること）

(Supply similar information and signature for third and subsequent joint inventors.)